

**ASTM D 4643 - MICROWAVE METHOD OF DRYING SOILS**

Conduct this procedure according to ASTM D 4643.

**SCOPE**

This procedure is used to determine the total moisture content of a soil. The soil is dried to remove all free moisture. This test measures the weight of the moisture removed from the soil.

**APPARATUS**

Balance, readable to 0.1 g	Microwave oven
Microwave safe dish	Oven mitts
Glass rod, spatula or knife	Heat sink

It is preferable that the microwave oven have a vented chamber. The microwave oven shall have a power rating of about 700 watts with variable power control.

**PROCEDURE**

Record all weights to the nearest 0.1 g.

Weigh a clean and dry microwave safe dish and record the weight as tare weight.

Determine the sample size needed from the table below.

Sieve Retaining Not More Than About 10% of Sample	Recommended Mass of Moist Specimen
No. 10 (2.0 mm)	100 to 200 g
No. 4 (4.75 mm)	300 to 500 g
3/4" (19 mm)	500 to 1000 g

Place the sample in the container and immediately weigh. Record this weight as wet weight.

Place the container in the microwave oven with a heat sink, set power to defrost setting, set timer for 3 minutes and start.\* The 3-minute initial time is a minimum.

\* See Notes

When the microwave oven stops, remove from the oven and weigh to the nearest 0.1 g and note.

Use a small spatula, glass rod, or knife and carefully mix the soil. Take care not to lose any soil.

Return the container and soil to the oven and reheat for 1 minute. Remove, weigh, and again mix with spatula, glass rod, or knife. Repeat this process until a constant weight has been achieved.

Use the final weight to calculate the moisture content. Record this weight as dry weight.

Discard sample after test.

## CALCULATIONS

Calculate the percent moisture as follows:

$$A = [(B - C)/C] \times 100$$

A = Percent moisture

B = Mass of original sample

C = Mass of dry sample

## REPORT

Report moisture to the nearest 0.1%.

## NOTES

Initial power setting may be higher than defrost. The proper power setting can be determined only through the use of, and experience with a particular microwave.

Soils that are high in moisture and contain a large portion of clay take a longer time to dry. Initial heating time for this type of soil may be 12 minutes. Care should be taken to reduce cohesive samples to 1/4" particles to speed drying and prevent crusting or overheating of the surface while drying the interior.

Constant weight is defined as when further drying will cause less than 0.1% additional loss in mass when weighed at specified intervals. Specified weighing interval for microwave drying is one minute.

## CALIBRATION

A calibration check of the equipment should be performed annually as a minimum, or whenever damage or repair occurs.